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BIBLIOGRAPHY AND INDEX OF LITERATURE ON URANIUM AND THORIUM AND RADIOACTIVE OCCURRENCES IN THE UNITED STATES

PART 2: CALIFORNIA, IDAHO, MONTANA, OREGON, WASHINGTON, AND WYOMING

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FOREWORD

The following bibliography consists of references to published literature, press releases, speeches, and both open-file and other unclassified reports dealing with uranium, thorium, and radioactive occurrences in California, Idaho, Montana, Oregon, Washington, and Wyoming. It is Part 2 of a comprehensive bibliography planned to cover references to all similar deposits throughout the world. While the object has been to make the present bibliography as all-inclusive as possible, from the point of view of including all the major papers and at least one reference to each known radioactive occurrence in these States, only references for which the original text was readily available for examination and checking have been cited at this time. The remaining old and new references will be added to this basic list when the section is ready for inclusion in the comprehensive volumes, planned for future publication as a complete bibliography of the entire United States and world.

The main bibliography consists of an author section, in which each reference has been assigned an individual item number. Following the author listings are the anonymous notes, which are listed in chronological order, and alphabetically by title within each year. The bibliography proper is followed by three indexes: Index I, Gazetteer for California, Idaho, Montana, Oregon, Washington, and Wyoming; Index II, Geographical Index for California, Idaho, Montana, Oregon, Washington, and Wyoming; Index III, Subject Index for California, Idaho, Montana, Oregon, Washington, and Wyoming. The geographical and subject indexes have been made as detailed as practicable since the main reference entries have not been annotated. Where there are variations in spelling or alternate names for the same locality, a standard form has been used in the geographical and subject indexes, and the variations have been noted in the gazetteer. Where county boundary lines have been changed since a reference was written, the locality has been listed under the county in which it is found today.

A fairly extensive survey has been made of the geological and mining literature published through 1949 in compiling the references included in this bibliography. A few of the standard American and English geological and mining publications have also been reviewed up to the early part of 1952. Every reference cited in the bibliography has been checked with the original text. References re-cited from Part 1* of the bibliography, covering Arizona, Nevada,

* Cooper, Margaret, 1953, Bibliography and index of literature on uranium and thorium and radioactive occurrences in the United States. Part 1: Arizona, Nevada, and New Mexico: Geol. Soc. America Bull., v. 64, p. 197–234.

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and New Mexico, have been assigned the same item number as in Part 1. The authors and item numbers of these re-cited references have also been recorded here in regular alphabetical order in the second group of author listings, which gives all the new references on the States covered by this bibliography.

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IDAHO

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General: recovery from gold placers: 77.
Atkinson Dredging Co. lands: 364.
Phosphates, Uranium-bearing, Occurrences—
General: 53.
Low grade uranium ores: 306.
Thorium Occurrences—
General: 12, 25; gadolinite: 298; monazite: 299.
Atkinson Dredging Co. lands: monazite, production: 364.
Black sand deposits: monazite: 283.
Boise and Idaho Counties: estimated 200 million cu. yds. gravel with 0.2–0.3% monazite: 363.
Idaho Batholith: allanite in aplites: 189; allanite in inner facies (monzonite, etc): 189; allanite in marginal facies (granodiorite): 189; composition: 189; mineral relations and their interpretation: 189; rock descriptions: 189.
Monazite deposits: companies formed to work: 207.
Monazite treatment process: 358.
Placer deposits: monazite: 306; monazite, thoria content 4.75–5%: 327; monazite content, at least, 0.1%: 327; monazite reserves under study by U.S.B.M. for U.S.A.E.C.: 306; most extensive monazite-bearing gravels have only traces of gold: 306.
Uranium Occurrences—
General: 12, 13, 25.
Gold placers: brannerite: 2.
Phosphates, Uranium-bearing: 53; low grade uranium ores: 306.
Types: hydrothermal vein deposits: 62; lignites, uranium-bearing: 62; phosphorites: 62.
Uranium Prospecting—
General: 90.

Ada County
Monazite Occurrences—
Boise: 78, 82, 217; from a trace to 219.6 lbs. per ton: 11.
Monazite Production—
Boise: plant to recover monazite: 385.
Thorium Occurrences—
Boise: monazite: 78, 82, 217; monazite, from a trace to 219.6 lbs. per ton: 11.
Thorium Production—
Boise: plant to recover monazite: 385.

Adams County
Monazite Occurrences—
John Day Creek: 78, 82.
Meadows: 78, 82, 217; .1 to 123 lbs. per ton: 11.
Snake River: 78, 82.
Thorium Occurrences—
John Day Creek: monazite: 78, 82.
Meadows: monazite: 78, 82, 217; monazite, .1 to 123 lbs. per ton: 11.
Snake River: monazite: 78, 82.

Autunite Occurrences
See under individual county names and under Index III, Autunite Occurrences—Idaho: 190, 301.

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Thorium Occurrences: 9, 290, 299.
Uranium Occurrences: 9, 10, 290.

Bingham County
Monazite Occurrences—
Snake River: trace in sands: 11, 240.
Thorium Occurrences—
Snake River: monazite, trace in sands: 11, 240.

Boise County
Fergusonite Occurrences—
Idaho City dredge, Idaho City: in placer sand: 298.
Monazite Occurrences—
General: 0.2–0.3% in stream gravels: 363.
Boise Basin: 78, 82, 194, 247, 290; 250 lbs. per ton: 11; monazite, recovery plant at Boise: 385.
Baumhoff-Marshall operations in Boise Basin: jig concentrates with 2.2% thorium oxide and 0.13% monazite per ton of gravel: 300.
Monazite group of Western Gold Corp.: placers: 349

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Centerville: 82, 194, 237, 242, 252, 285, 298; from a trace to 286 lbs. per ton: 11.
Centerville Mining & Milling Co.: lands near Idaho City along Grimes and Quartz Creeks and their tributaries: 328; mill built to recover and clean monazite sand, burned and not rebuilt: 298; operated placers at Centerville on Grimes and Granite Creeks: 326.
Elk Creek placers near Idaho City: to be worked for monazite: 349.
Garden Valley: 32 lbs. per ton: 11.
Grimes Creek near Centerville: from a trace to 358 lbs. per ton: 11.
Idaho Basin: 197, 259, 260, 298.
Idaho City: 78, 82, 194, 252, 298; 42 lbs. per ton: 11; from lake beds: 259.
Idaho City Mining District: 241.
Quartzburg Mining District: 241.
Junction of Moore and Granite Creeks 3 mi. E of Idaho City: 298; in gravel bench carrying about 1.20% thoria: 260.
Marsh: 38 lbs. per ton: 11.
Moore Creek Mining District: 241.
Placerville: 78, 82; 36 to 170 lbs. per ton: 11.
Poncia placer tract in Swede Gulch near center of S. 9, T. 7 N., R. 5 E., 1½ mi. SE of Pioneerville: with polycrase in heavy sand: 298.
Red Fox claim, Centerville Mining District: 30 and 224 lbs. per ton: 11.
Wolf Creek near Centerville: in alluvial gold washings: 260.
Wolf Creek near Placerville: from alluvial gold washings: 259.
Monazite Production—
Centerville Mining & Milling Co.: operated monazite placers at Centerville on Grimes and Granite Creeks: 326.
Polycrase Occurrences—
Centerville: 298.
Poncia placer tract in Swede Gulch near center of S. 9, T. 7 N., R. 5 E., 1½ mi. SE of Pioneerville: 298.
Samarskite Occurrences—
Boise Basin: 194.
Idaho City: 194.
Idaho City dredge, Idaho City: in heavy concentrate: 298.
Thorium Occurrences—
General: 0.2–0.3% monazite in stream gravels: 363.
Boise Basin: monazite: 78, 82, 247, 290; monazite, 250 lbs. per ton: 11; monazite; recovery plant at Boise: 385; monazite, samarskite: 194.
Baumhoff-Marshall operations in Boise Basin: monazite in jig concentrates showed 2.2% thorium oxide and 0.13% monazite per ton of gravel: 300.
Monazite group of Western Gold Corp.: monazite placers: 349.
Centerville: monazite: 82, 194, 237, 242, 252, 285; monazite, from a trace to 286 lbs. per ton: 11; monazite in gold placers: 298; polycrase in placer concentrate: 298.
Centerville Mining and Milling Co.: lands near Idaho City along Grimes and Quartz Creeks and their tributaries; monazite: 328; mill built to recover and clean monazite sand, burned and not rebuilt: 298; operated placers at Centerville on Grimes and Granite Creeks; monazite: 326; methods of mining and concentration: 326.
Elk Creek placers near Idaho City: to be worked for monazite: 349.
Garden Valley: monazite, 32 lbs. per ton: 11.
Grimes Creek near Centerville: monazite, from a trace to 358 lbs. per ton: 11.
Idaho Basin: monazite: 197, 259, 260; monazite with gold in placers: 298.
Idaho City: monazite: 78, 82, 252; monazite, 42 lbs. per ton: 11; monazite from lake beds: 259; monazite, samarskite: 194, 298.
Idaho City dredge, Idaho City: samarskite in heavy concentrate: 298.
Idaho City Mining District: monazite: 241.
Quartzburg Mining District: monazite: 241.
Junction of Moore and Granite Creeks 3 mi. E. of Idaho City: monazite in gravel bench carrying about 1.20% thoria: 260; monazite in sandy lake beds forming false bedrock in gravel bench: 298.
Marsh: monazite, 38 lbs. per ton: 11.
Moore Creek Mining District: monazite: 241.
Placerville: monazite: 78, 82; monazite, 36 to 170 lbs. per ton: 11.
Poncia placer tract in Swede Gulch near center of S. 9, T. 7 N., R. 5 E., 1½ mi. SE of Pioneerville: polycrase with monazite in heavy sand: 298.
Red Fox Claim, Centerville Mining District: monazite, 30 and 224 lbs. per ton: 11.
Wolf Creek near Centerville: monazite in alluvial gold washings: 260.
Wolf Creek near Placerville: monazite from alluvial gold washing: 259.
Uranium Occurrences—
Boise Basin: monazite, samarskite: 194.
Carterville: uranophane: 82.
Centerville: polycrase in placer concentrate: 298.
Centerville in Idaho Basin: uranophane: 298.
Idaho City: monazite, samarskite: 194.
Idaho City dredge, Idaho City: fergusonite in placer sand: 298; samarskite in heavy concentrate: 298.
Poncia placer tract in Swede Gulch near center of S. 9, T.7N., R.5E., 1½ mi. SE of Pioneerville: polycrase with monazite in heavy sands: 298.
Uranophane Occurrences—
Carterville: 82.
Centerville in Idaho Basin: 298.

Bonner County
Thorium Occurrences—
Pend Oreille Mining District
Lake Pend Oreille area:
Bayview granodiorite: allanite: 230; geology. 230; mineralization: 230; mineralogy: 230; petrography: 230.
Granite Creek granodiorite: allanite: 230; geology: 230; mineralization: 230; mineralogy: 230; petrography: 230.

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Packsaddle Mountain granodiorite: allanite: 230; geology: 230; mineralization: 230; mineralogy: 230; petrography: 230.

Brannerite Occurrences
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Canyon County
Monazite Occurrences—
Payette River: 6 lbs. per ton: 11.
Thorium Occurrences—
Payette River: monazite, 6 lbs. per ton: 11.

Carnotite Occurrences
See under individual county names and under Index III, Carnotite Occurrences—Idaho: 53.

Clearwater County
Monazite Occurrences—
Dent: 78, 82, 217; 126 to 283 lbs. per ton: 11.
Little John claim, Gold Run Creek: 295.
Musselshell Creek: 193, 290, 298.
Musselshell Creek, 28 mi. E of Greer and 10 mi. from Weippe: 82, 295.
Musselshell Creek (Weippe) Mining District: 241.
North Fork Clearwater River: 193; 46 lbs. per ton: 11.
Orofino: 78, 82, 104; 6 to 88 lbs. per ton: 11.
Pierce: 193, 290; from a trace to 94 lbs. per ton: 11.
Pierce, Cow Creek: 46 to 81 lbs. per ton: 11.
Pierce Mining District: 298; 70 lbs. per ton: 11.
Rhodes Creek: trace: 11.
Thorium Occurrences—
Dent: monazite: 78, 82, 217; monazite, 126 to 283 lbs. per ton: 11.
Little John claim, Gold Run Creek: monazite, best prospect in area: 295.
Musselshell Creek: monazite: 193, 290; monazite in gold placers: 298; monazite samples cleaned to 90% or usual commercial grade averaged 3% thoria: 298.
Musselshell Creek, 28 mi. E of Greer and 10 mi. from Weippe: monazite: 82, 295.
Musselshell Creek (Weippe) Mining District: monazite: 241.
North Fork Clearwater River: monazite: 193; monazite, 46 lbs. per ton: 11.
Orofino Region
Along Clearwater River between Ahsaka and Peck station: allanite, 246; geology, 246; mineralization, 246; mineralogy, 246; petrography: 246.
Along North Fork Clearwater River N. of mouth of Freeman Creek: allanite, 246; geology, 246; mineralization, 246; mineralogy, 246; petrography: 246.
Along Orofino Creek, E. of mouth of Whiskey Creek, gneissic rocks: allanite, 246; geology, 246; mineralization, 246; mineralogy, 246; petrography: 246.
Idaho Batholith SE of Orofino: allanite: 246.
Orofino: monazite: 78, 82; monazite in gold placers: 104; monazite, 6 to 88 lbs. per ton: 11.
Pierce: monazite: 193, 290; monazite, from a trace to 94 lbs. per ton: 11.
Pierce, Cow Creek: monazite, 46 to 81 lbs. per ton: 11.
Pierce Mining District: monazite, 70 lbs. per ton: 11; monazite in concentrates: 298.
Rhodes Creek: monazite, trace: 11.

Custer County
Brannerite Occurences—
Kelly Gulch, Stanley Basin: 238, 239, 316.
Stanley Basin near head of Kelly Gulch in placer worked by Henry Sturkey: 298.
Euxenite Occurences—
Kelly Gulch, Stanley Basin: placer mine: 196.
Stanley Basin near head of Kelly Gulch in placer worked by Henry Sturkey: 298.
Thorium Occurrences—
Kelly Gulch, Stanley Basin: brannerite: 239, 316; brannerite in placers: 238; placer mine, euxenite: 196.
Stanley Basin near head of Kelly Gulch in placer worked by Henry Sturkey: brannerite with gold; euxenite: 298.
Uranium Occurrences—
Kelly Gulch, Stanley Basin: brannerite: 238, 239, 316; placer mine, euxenite: 196.
Stanley Basin near head of Kelly Gulch in placer worked by Henry Sturkey: brannerite with gold; euxenite: 298.

Elmore County
Thorium Occurrences—
Rocky Bar Mining District
Idaho Batholith: allanite: 191.

Euxenite Occurrences
See under individual county names and under Index III, Euxenite Occurrences—Idaho: 196, 298.

Fergusonite Occurrences
See under individual county names and under Index III, Fergusonite Occurrences—Idaho: 298.

Idaho County
Monazite Occurrences—
General: 0.2–0.3% in stream gravels: 363.
Baker Gulch, Crooked River: 320 lbs. per ton: 11.
Camp Howard Mining District: trace: 11.
Davis Mining Co. property between Secesh River and Lower Ruby Creek: in placers: 208.
Elk City: 26 to 108 lbs. per ton: 11.
Elk City Mining District: 6 to 808 lbs. per ton: 11.
Florence Mining District
Florence: trace: 11.
Grouse Creek: 284.
Lake Creek: 208.
Marshall Lake District: 376 lbs. per ton: 11.
Middle Fork Clearwater River: 193.
Northern Part: 290.
Resort: 112 lbs. per ton: 11.
Ruby Creek: 208.
South Fork Mining & Leasing Co., Buffalo Gulch near Elk City: 374.
Syringa: trace: 11.
Tyee Mining Co. near Elk City: low content: 300.

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Warren Mining District: 82.
Ruby placers: high content: 300.
Warren Basin: 197.
Warren Creek: 372.
Warren Meadows: with uraninite: 285.
Thorium Occurrences—
General: 0.2–0.3% monazite in stream gravels: 363
Baker Gulch, Crooked River: monazite, 320 lbs. per ton: 11.
Camp Howard Mining District: monazite, trace: 11.
Davis Mining Co. property between Secesh River and Lower Ruby Creek: monazite in placers: 208.
Elk City: monazite, 26 to 108 lbs. per ton: 11.
Elk City Mining District: monazite, 6 to 808 lbs. per ton: 11.
Florence Mining District
General: allanite: 284.
Florence: monazite, trace: 11.
Grouse Creek: monazite: 284.
Lake Creek: monazite: 208.
Marshall Lake district: monazite, 376 lbs. per ton: 11.
Middle Fork Clearwater River: monazite: 193.
Northern Part: monazite: 290.
Resort: monazite, 112 lbs. per ton: 11.
Ruby Creek: monazite: 208.
South Fork Mining & Leasing Co., Buffalo Gulch near Elk City: monazite: 374.
Syringa: monazite, trace: 11.
Tyee Mining Co. near Elk City: low in monazite: 300.
Warren Mining District: monazite: 82.
Buck Placer, Houston Creek: uraninite: 285.
Ruby placers: high in monazite: 300.
Warren Basin: monazite: 197.
Warren Creek: monazite: 372.
Warren Meadows: monazite, ThO_2 percentage given; uraninite: 285.
Uraninite Occurrences—
Warren Mining District
Buck Placer, Houston Creek: 285.
Warren Meadows: 285.
Uranium Occurrences—
General: uranium oxide with 15–60% uranium in Upper Cretaceous sandstone: 333.
Knob Hill, Orogrande: uranium and molybdenite: 332.
Warren Mining District
Buck Placer, Houston Creek: uraninite: 285.
Warren Meadows: uraninite: 285.

Latah County
Autunite Occurrences—
Avon, 3–6 mi. N. of: questionable occurrence: 190.
Last Chance mine, Avon Mica district: with metatorbernite: 301.
Meta-torbernite Occurrences—
Last Chance mine, Avon Mica district: with autunite: 301.
Uranium Occurrences—
Avon, 3–6 mi. N. of, mica pegmatites: autunite(?): 190; geographic features: 190; geology: 190; mineralogy: 190; wall rock alteration: 190.
Last Chance mine, Avon Mica district, 3 mi. N of Avon and 23 mi. NE of Moscow: autunite, meta-torbernite in pegmatite: 301; geology: 301.

Lemhi County
Monazite Occurrences—
Leesburg: 78, 82, 217; 20 to 44 lbs. per ton: 11.
Leesburg Basin: .5 to 10 lbs. per ton: 11; placer diggings: 217.
Arnett Creek: 217; .5 lb. per ton: 11.
Richardson Bros. property: 217.
Wards Gulch: 217; 5 lbs. per ton: 11.
Radioactive Areas—
Kentuck mine, N side of Salmon River W of Shoup: low radioactivity; no uranium reported: 311.
Ulysses—Kittie Burton mill on Indian Creek, 4 mi. from main road on Salmon River and 37 mi. by road NW of Salmon: geology; mines and mill not worked; mines inaccessible by car and not visited; no abnormal radioactivity in readings along Indian Creek road nor in crude and ground ore, concentrates, and tailings, no samples taken: 311.
Thorium Occurrences—
Leesburg: monazite: 78, 82, 217; monazite, 20 to 44 lbs. per ton: 11.
Leesburg Basin: monazite, .5 to 10 lbs. per ton: 11; placer diggings, monazite: 217.
Arnett Creek: monazite: 217; monazite, .5 lb. per ton: 11.
Richardson Bros. property: monazite: 217.
Wards Gulch: monazite: 217; monazite, 5 lbs. per ton: 11.
Uranium Occurrences—
Garm-Lemoureaux mine, owned by the estate of Ira Lemoureaux, on Allan Creek, 30 mi. by road N of Salmon: geology: 311; material on dumps contained 0.015–0.13% equivalent uranium and 0.005–0.11% uranium: 311; radioactivity: 311.
Grunter mill owned by Gold Producers, Inc.: mill concentrate contained 0.071% equivalent uranium and 0.043% uranium: 311.
Grunter mine owned by Gold Producers, Inc., on N side of Salmon River W of Shoup: geology: 311; radioactivity: 311; three ore samples contained 0.002–0.01% equivalent uranium and 0.001% uranium: 311.
Road cut, N end Pine Creek bridge, Shoup: chloritic material in fracture, 0.004% equivalent uranium and 0.001% uranium: 311; fracture surface with chlorite (?), 0.01% equivalent uranium: 311; gneiss, 0.01% equivalent uranium: 311; quartz monzonite porphyry, 0.01% equivalent uranium: 311.

Lincoln County
Monazite Occurrences—
Shoshone: 217; 26 lbs. per ton: 11, 240.
Thorium Occurrences—
Shoshone: monazite: 217; monazite, 26 lbs. per ton: 11, 240.

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Meta-torbernite Occurrences
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Minidoka County
Monazite Occurrences—
Minidoka: 78, 82; 8 lbs. per ton: 11, 240.
Thorium Occurrences—
Minidoka: monazite: 78, 82; monazite, 8 lbs. per ton: 11, 240.

Monazite Occurrences
See under individual county names and under Index III, Thorium Occurrences—Idaho: 11, 78, 82, 104, 193, 194, 197, 207, 208, 212, 217, 237, 240, 241, 242, 247, 252, 259, 260, 283, 284, 285, 290, 295, 298, 299, 300, 306, 326, 327, 328, 349, 357, 358, 363, 364, 366, 368, 371, 372, 374, 385, 387, 391.
Bibliography: 290, 299.

Monazite Processes
See under individual county names and under Index III, Monazite Processes—Idaho: 358, 363, 366, 371.

Monazite Production
See under individual county names and under Index III, Monazite Production—Idaho: 326, 364, 368, 385, 387, 391.

Nez Perce County
Monazite Occurrences—
Lewiston, Clearwater River: 52 lbs. per ton: 11.
Salmon River: 217; trace: 11.
Thorium Occurrences—
Lewiston, Clearwater River: monazite, 52 lbs. per ton: 11.
Salmon River: monazite: 217; monazite, trace: 11.

Owyhee County
Monazite Occurrences—
Oreana: 78, 82; 56 lbs. per ton: 240.
Thorium Occurrences—
Oreana: monazite: 78, 82; monazite, 56 lbs. per ton: 240.

Payette County
Monazite Occurrences—
Payette River: 78, 82.
Thorium Occurrences—
Payette River: monazite: 78, 82.

Phosphates, Uranium-bearing, Occurrences
See under individual county names and under Index III, Phosphates, Uranium-bearing, Occurrences—Idaho: 53, 306.

Pitchblende Occurrences
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Polycrase Occurrences
See under individual county names and under Index III, Polycrase Occurrences—Idaho: 298.

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Radioactive Areas
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Samarskite Occurrences
See under individual county names and under Index III, Samarskite Occurrences—Idaho: 194, 298.

Shoshone County
Carnotite Occurrences—
Coeur d'Alene Mining District
Sunshine mine: in Pre-Cambrian Belt series: 53.
Pitchblende Occurrences—
Coeur d'Alene Mining District:
Coeur d'Alene mine: 102.
Sunshine mine: 102, 267.
Radioactive Areas—
Coeur d'Alene Mining District
Sunshine mine
Morningstar vein: galena ores: 45.
Sunshine vein: galena ores: 45.
Tamarack vein: galena ores: 45.
Radioactive Galena Ores—
Coeur d'Alene Mining District
Sunshine mine
Morningstar vein: 45.
Sunshine vein: 45.
Tamarack vein: 45.
Thorium Occurrences—
Coeur d'Alene Mining District:
allanite: 192.
Coeur d'Alene mine: uraninite: 305.
Sunshine mine, Sunshine Mining Co., at Kellogg: uraninite: 305, 367, 373.
Uraninite Occurrences—
Coeur d'Alene Mining District
Coeur d'Alene mine: 288, 305.
Sunshine mine, Sunshine Mining Co., at Kellogg: 251, 288, 305, 367, 373; age determination by lead isotopes: 250; chemical analysis showing 26.9% U_3O_8 and no thorium: 250; in Sunshine vein: 250.
Uranium Occurrences—
Coeur d'Alene Mining District
Coeur d'Alene mine: pitchblende: 102; present uranium exposures marginal in grade: 306; small uranium showing: 306; uraninite: 288, 305.
Sunshine mine, Sunshine Mining Co., at Kellogg: carnotite in Pre-Cambrian Belt series: 53; geology: 251; mineralization: 251; most important known potential uranium source in area: 306; pitchblende: 102, 267; present uranium exposures marginal in grade: 306; uraninite: 251, 288, 305, 367, 373; uraninite, age determination by lead isotopes: 250; uraninite, chemical analysis showing 26.9% U_3O_8 and no thorium: 250; uraninite in Sunshine vein: 250; uranium: 386.

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Bibliography: 9, 290, 299.

Thorium Production
See under individual county names and under Index III, Thorium Production—Idaho: 385.

Twin Falls County
Uranium Occurrences—
Cedar Creek 20 mi. W. of Rogerson: uranium deposit in a crater carries 1.15% U_3O_8: 336.
Rabbit Springs S. of Twin Falls: uranium in geodes: 266.

Uraninite Occurrences
See under individual county names and under Index III, Uraninite Occurrences—Idaho: 250, 251, 285, 288, 305, 367, 373.

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See under individual county names and under Index III, Uranium Occurrences—Idaho: 2, 53, 82, 102, 190, 194, 196, 238, 239, 250, 251, 266, 267, 285, 288, 290, 298, 301, 305, 306, 311, 316, 332, 333, 336, 367, 373, 386.
Bibliography: 9, 10, 290.

Uranium Prospecting
See under individual county names and under Index III, Uranium Prospecting—Idaho: 90.

Uranophane Occurrences
See under individual county names and under Index III, Uranophane Occurrences—Idaho: 82, 298.

Valley County
Monazite Occurrences—
Big Creek area near Cascade: monazite production: 212.
Big Creek S of Cascade: 371.
Cascade: gravels dredged by Baumhoff-Marshall: 391; in placers and gold tailings: 387.
Lardo: 20 lbs. per ton: 11.
McCall: 357; monazite, treatment process: 366.
Penmans Fork, Big Creek: 528 lbs. per ton: 11.
Rare Earth Minerals Co., McCall: from placers; to ship 16000 t. concentrates in next 10 years: 368.
Monazite Processes—
General: treatment processes: 366.
Monazite Production—
Big Creek area near Cascade: 212.
Cascade: Baumhoff-Marshall to install new, larger dredge for deeper monazite gravels: 391; monazite gravels dredged by Baumhoff-Marshall: 391; placers and gold tailings: 387.
Rare Earth Minerals Co., McCall: to ship 16000 t. concentrates in next 10 years: 368.
Thorium Occurrences—
Big Creek area near Cascade: monazite production: 212.
Big Creek S of Cascade: monazite: 371.
Cascade: monazite gravels dredged by Baumhoff-Marshall: 391; monazite in placers and gold tailings: 387.
Lardo: monazite, 20 lbs. per ton: 11.
McCall: monazite: 357; monazite, treatment process: 366.
Penmans Fork, Big Creek: monazite, 528 lbs. per ton: 11.
Rare Earth Minerals Co., McCall: monazite from placers: 368.
Stibnite, 5 mi. S. of: allanite in pegmatitic rock, radiometric analysis with Geiger counter gave 0.32% Th: 249.

MONTANA
General
Agates, Uranium-bearing, Occurrences—
Yellowstone River basin: 214.
Lignites, Uranium-bearing, Occurrences—
General: 27.
Phosphates, Uranium-bearing, Occurrences—
General: 53.
Low grade uranium ores: 306.
Thorium Occurrences—
General: 12, 25.
Uranium Occurrences—
General: 12, 13, 25, 118.
Lignite, Uranium-bearing: 27.
Phosphates, Uranium-bearing: 53; low grade uranium ores: 306.
Radium ore deposits: 209.
Types: hydrothermal vein deposits: 62.
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Pitchblende Occurrences—
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Gilmore and Pittsburg Railway, 34 mi. from Armstead and 10 mi. from Brenner· pitchblende: 331.

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Princeton: 78, 82; 6 lbs. per ton: 11.
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Little Gold Creek: monazite in gold placers: 262.
Princeton: monazite: 78, 82; monazite, 6 lbs. per ton: 11.

Jefferson County
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Boulder Mining District
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Boulder: Sunshine Mining Co. of Kellogg investigating discovery; unnamed radioactive mineral: 365.
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Basin-Boulder-Clancey area
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Comstock group: radioactivity: 286.
Gold Point claim: secondary uranium minerals: 286.
King Solomon mine: slight radioactivity: 286.
Liverpool mine N side of Lump Gulch, 2 mi. N of Clancey: radioactivity: 286.
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Lake Delmoe: allanite: 210, 236; in gold placers; spectrographic analysis shows no uranium or thorium: 235.
Torbernite Occurrences—
Boulder Mining District
Free Enterprise group, Elkhorn Mining Co., near Boulder: with carnotite: 378.
Uraninite Occurrences—
Boulder: first car-load shipped from state: 388.
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Alhambra District: prospecting: 388.
Anchor Mining & Milling Co. property, 29 mi. SE of Helena: uranium: 375.
Basin-Boulder-Clancey area
General: 286.
Basin: prospecting: 388.
Beavertown Ranch: secondary uranium minerals: 286.
Boulder: uraninite, car-load shipped, first from Montana: 388.
Clancey: prospecting: 388.
Forty-Niner claim W of Clancey: secondary uranium minerals: 253.
Hinman group (West End, Forty-Niner, King Solomon, Blue Monday), W of Clancey: uranium: 286.
Josephine mine, 15 mi. N of Basin: radiometric survey; uranium: 286.
King Solomon Ridge claim W of Clancey: secondary uranium minerals: 253.
Meadow mine 2 mi. N of Clancey: uranium, radioactivity: 286.
Mountain Queen and Jack Mines 12 mi. E of Trask at head of Hay Canyon: meta-torbernite, slight radioactivity: 286.
West End claim W of Clancey: secondary uranium minerals: 253.
Boulder Batholith, northern part of: vein deposits with a trace to several percent uranium: 306.
Boulder Mining District
Elkhorn Mining Co., property near Boulder: uranium development work abandoned by Sunshine Mining Co.: 381.
Free Enterprise claim, Elkhorn Mining Co., near Boulder: economic geology; exploration work; general geology; geography; mineralogy; mining history; 304; pitchblende: 304, 376, 377; structure: 304.
Free Enterprise group of about 1300 acres, ½ mi. NW of Boulder station, owned by Elkhorn Mining Co.: uranium-silver ore: 307; carnotite, torbernite: 378.
New Enterprise claims, Elkhorn Mining Co., near Boulder: Sunshine Mining Co. abandoning uranium development work: 379.
Clancey Mining District
Haynes properties 1 mi. W of Alhambra: shipped first uranium ore from area: 390; U.S.A.E.C. bonus producer: 390.
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Boulder: uraninite, first car-load shipped from state: 388.
Clancey Mining District
Haynes properties 1 mi. W of Alhambra: first uranium shipped from area: 390.
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Idaho Gold & Radium, Leonia, Idaho, property 25 mi. W. of Libby: pitchblende: 329.

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Idaho Gold & Radium, Leonia, Idaho, property 25 mi. W. of Libby: pitchblende and gold in vein: 329.
Oro mine, owned by R. & H. Obermeyer, E. Phillips, and T. McIntyre, on Ruby Creek SW of Troy: geology: 311; radioactivity: 311; sample across 2 ft. vein in lower adit, 0.01% equivalent uranium: 311; 2 samples from ore box of lower dump—a grab sample, 0.009% equivalent uranium, a sample of material showing highest radioactivity, 0.014% equivalent uranium, 0.012% uranium, 311; 2 samples from upper dump, 0.007–0.01% equivalent uranium, 0.005% uranium: 311.

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Sappington: 211, 235, 236; Sappington Mica mine: 210.
Monazite Occurrences—
Norris: with thorianite: 78.
Thorianite Occurrences—
Norris: 82, 235; with monazite: 78.
Thorium Occurrences—
California Gulch, near head of, 4 mi. E of Laurin: fergusonite in placer: 235.
Laurin: fergusonite: 210, 211; in placer: fergusonite: 236.
Norris: thorianite: 82, 235; with monazite: 78.
Sappington: fergusonite: 211, 235, 236; Sappington Mica mine: fergusonite: 210.
Uranium Occurrences—
California Gulch, near head of, 4 mi. E of Laurin: fergusonite in placer: 235.
Laurin: fergusonite: 210, 211; in placer: fergusonite: 236.
Norris: thorianite: 82, 235; with monazite: 78.
Sappington: fergusonite: 211, 235, 236; Sappington Mica mine: fergusonite: 210.
Upper Hot Springs Mining District
Golden Link group, 8 unpatented claims, 5½ mi. from Norris: uranium reported: 313.

Meta-torbernite Occurrences
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Park County
Radioactive Rocks—
Quarry N of Gardiner: excavation in old travertine, radium emanation, 0.6×10^{-12} g. Ra per gram: 293.

Phosphates, Uranium-bearing, Occurrences
See under individual county names and under Index III, Phosphates, Uranium-bearing, Occurrences—Montana: 53, 306.

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Powell County
Monazite Occurrences—
General: 78, 82; 16.3 lbs. per ton: 11.
Thorium Occurrences—
General: monazite: 78, 82; monazite, 16.3 lbs. per ton: 11.

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Radium Occurrences
See under individual county names and under Index III, Uranium Occurrences—Montana: 209.

Secondary Uranium Minerals
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Silver Bow County
Thorium Occurrences—
Janney: allanite: 236; in pegmatite; spectrographic analysis shows no uranium or thorium: 235.

Stillwater County
Radioactive Rocks—
Stillwater Complex: bronzitite; radium content, 0.007×10^{-12} g./g.: 216.
Stillwater Complex: dunite; radium content, 0.015×10^{-12} g./g.: 216.
Stillwater Complex, harzburgite; petrographic description: 216; radium content, 0.014×10^{-12} g./g.: 216.
Uranium Occurrences—
Mouat Nickel Mines, Inc., claims, 40 mi. SW of Columbus at Nye: uranium: 307.

Thorianite Occurrences
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Western Part
Radioactive Areas—
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Black sand deposits: 283.
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Thorium: 308, 317.
Uranium: 90, 308, 317.
Thorium Occurrences—
General: 12, 25.
Black sand deposits: monazite: 283.
Monazite in placers: 272.
Thorium Prospecting—
General: 308, 317.
Uranium Occurrences—
General: 12, 13, 25.
Uranium Prospecting—
General: 90, 308, 317.

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Baker County
Monazite Occurrences—
Durkee: trace: 11.
Sumpter: 217.
Thorium Occurrences—
Durkee: monazite, trace: 11.
Sumpter: monazite: 217.
Torbernite Occurrences—
Baker: scales on copper ore: 324.
Uranium Occurrences—
Baker: torbernite, scales on copper ore: 324.

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Monazite Occurrences: 222.
Thorium Occurrences: 9, 222.
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Chalcedony, Uranium-bearing, Occurrences
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Clatsop County
Monazite Occurrences—
Astoria: 317; from a trace to 131 lbs. per ton: 11; in black sands: 78, 82.
Beach sands: 281.
Carnahan station: 317; from a trace to .5 lb. per ton: 11; in black sands: 82.
Clatsop: in black sands: 82; 2 lbs. per ton: 11.
Clatsop Beach: 217, 317; in black sands: 82; .4 lb. per ton: 11.
Clatsop Spit: 317; in black sands: 82; Columbia River: .1 to .6 lb. per ton: 11.
Elk Creek: .4 to 4 lbs. per ton: 11.
Elk Park: in black sands: 82.
Fort Stevens: 317; in black sands: 82; .2 to 1 lb. per ton: 11.
Gearhart Beach: 317; in black sands: 82; .1 lb. per ton: 11.
Gearhart Park: in black sands: 82; .4 to 1 lb. per ton: 11.
Hammond: 317; in black sands: 82; .4 to 2 lbs. per ton: 11.
Morrison: in black sands: 82; .3 lb. per ton: 11.
Seaside: in black sands: 82; 1 lb. per ton: 11.
Warrenton: 317; in black sands: 78, 82; .1 to 1 lb. per ton: 11.
Thorium Occurrences—
Astoria: monazite, from a trace to 131 lbs. per ton: 11; monazite in beach sands: 317; monazite in black sands: 78, 82.
Beach sands: monazite: 281.
Carnahan station: monazite, from a trace to .5 lb. per ton: 11; monazite in beach sand: 317; monazite in black sands: 82.
Clatsop: monazite, 2 lbs. per ton: 11; monazite in black sands: 82.
Clatsop Beach: monazite: 217; monazite, .4 lb. per ton: 11; monazite in beach sand: 317; monazite in black sands: 82.
Clatsop Spit: monazite in beach sand: 317; monazite in black sands: 82; Columbia River; monazite, .1 to .6 lb. per ton: 11.
Elk Creek: monazite, .4 to 4 lbs. per ton: 11.
Elk Park: monazite in black sands: 82.
Fort Stevens: monazite, .2 to 1 lb. per ton: 11; monazite in beach sand: 317; monazite in black sands: 82.
Gearhart Beach: monazite, .1 lb. per ton: 11; monazite in beach sand: 317; monazite in black sands: 82.
Gearhart Park: monazite, .4 to 1 lb. per ton: 11; monazite in black sands: 82.
Hammond: monazite, .4 to 2 lbs. per ton: 11; monazite in beach sand: 317; monazite in black sands: 82.
Morrison: monazite, .3 lb. per ton: 11; monazite in black sands: 82.
Seaside: monazite, 1 lb. per ton: 11; monazite in black sands: 82.
Warrenton: monazite, .1 to 1 lb. per ton: 11; monazite in beach sand: 317; monazite in black sands: 78, 82.

Coos County
Monazite Occurrences—
Randolph Mining District: 78, 82, 217; beach sand from a trace to 1 lb. per ton: 11.
South Fork Coquille River: 82; .4 lb. per ton: 11.

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Thorium Occurrences—
Randolph Mining District: monazite: 78, 82, 217; beach sand: monazite, from a trace to 1 lb. per ton: 11.
South Fork Coquille River: monazite: 82; monazite, .4 lb. per ton: 11.

Curry County
Monazite Occurrences—
Beach sands along coast: 204.
Eckley: 82.
Gold Beach: 78, 82, 217; .5 lb. per ton: 11.
Port Orford: 82, 217; .1 lb. per ton: 11.
Thorium Occurrences—
Beach sands along coast: monazite: 204.
Eckley: monazite: 82.
Gold Beach: monazite: 78, 82, 217; monazite, .5 lb. per ton: 11.
Port Orford: monazite: 82, 217; monazite, .1 lb. per ton: 11.

Harney County
Radium Analysis—
Fields ore: to be done in Germany: U. S. laboratory assays showed value of $1500 to $5000 per ton: 340.
Silica Deposits, Uranium-bearing—
Denio: uranium coating: 317.
Uranium Occurrences—
Black Rock mines between Pueblo and Steens Mts.: ore samples assayed 4.27% uranium oxide: 369; potentially rich uranium deposit: 369.
Denio: uranium coating on silica deposits: 317.
Fields: radium deposits developed: 340.
O. F. Selle claims at Fields: pilot plant installed: 343; radium deposits averaging 14% uranium: 343; radium deposits with several hundred tons of ore exposed: 343.

Hood River County
Monazite Occurrences—
Hood River: 78, 82; beach and sand bar, .4 to 5 lbs. per ton: 11.
Hood River, Columbia River: .5 to 1 lb. per ton: 11.
Hood River Beach: 217.
Thorium Occurrences—
Hood River: monazite: 78, 82; beach and sand bar, monazite, .4 to 5 lbs. per ton: 11.
Hood River, Columbia River: monazite, .5 to 1 lb. per ton: 11.
Hood River Beach: monazite: 217.

Jackson County
Monazite Occurrences—
Ashland: 217.
Birdseye Creek: trace: 11.
Gold Hill: trace: 11.
Thorium Occurrences—
Ashland: monazite: 217.
Birdseye Creek: monazite, trace: 11.
Gold Hill: monazite, trace: 11.

Jefferson County
Agates, Uranium-bearing, Occurrences—
Priday: 215.
Silica Deposits, Uranium-bearing—
Madras: uranium coating: 317.
Uranium Occurrences—
Madras: uranium coating on silica deposits: 317.
Priday: uranium in agates: 215.

Josephine County
Monazite Occurrences—
Holland: 78, 82; 24 lbs. per ton: 11.
Kerby Mining District: trace: 11.
Placer: 78, 82; 46 lbs. per ton: 11.
Sucker Creek: 78, 82; 12 lbs. per ton: 11.
Wolf Creek: 82, 217; .1 lb. per ton: 11.
Thorium Occurrences—
Holland: monazite: 78, 82; monazite, 24 lbs. per ton: 11.
Kerby Mining District: monazite, trace: 11.
Placer: monazite: 78, 82; monazite, 46 lbs. per ton: 11.
Sucker Creek: monazite: 78, 82; monazite, 12 lbs. per ton: 11.
Wolf Creek: monazite: 82, 217; monazite, .1 lb. per ton: 11.

Lake County
Opal, Uranium-bearing, Occurrences—
Plush, 35 mi. E. of Lakeview: 215.
Uranium Occurrences—
Plush, 35 mi. E. of Lakeview; uranium in opal in agates: 215.

Lincoln County
Monazite Occurrences—
Yaquina Bay: trace: 11.
Thorium Occurrences—
Yaquina Bay: monazite, trace: 11.

Linn County
Monazite Occurrences—
Foster: 78, 82, 217; .1 lb. per ton: 11.
Thorium Occurrences—
Foster: monazite: 78, 82, 217; monazite, .1 lb. per ton: 11.

Malheur County
Silica Deposits, Uranium-bearing—
Cow Creek N of Jordan Valley: uranium coating: 317.
Uranium Occurrences—
Cow Creek N of Jordan Valley: uranium coating on silica deposits: 317.

Monazite Occurrences
See under individual county names and under Index III, Thorium Occurrences—Oregon: 11, 78, 82, 204, 217, 222, 272, 281, 283, 317.

Multnomah County
Monazite Occurrences—
Fulton: 82; .5 lb. per ton: 11.
Latourell: 78.
Latourell, Columbia River sand: 479 lbs. per ton: 11.
Latourell Falls: 82.
Portland: 217.
Portland, Glisan Street: trace: 11.
Thorium Occurrences—
Fulton: monazite: 82; monazite, .5 lb. per ton: 11.
Latourell: monazite: 78.
Latourell, Columbia River sand: monazite, 479 lbs. per ton: 11.
Latourell Falls: monazite: 82.
Portland: monazite: 217.
Portland, Glisan Street: monazite, trace: 11.

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Polk County
Monazite Occurrences—
Falls City: 78, 82, 217; .4 lb. per ton: 11.
Thorium Occurrences—
Falls City: monazite: 78, 82, 217; monazite, .4 lb. per ton: 11.

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See under individual county names and under Index III, Radium, Analyses For—Oregon: 340.

Radium Occurrences
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Torbernite Occurrences
See under individual county names and under Index III, Torbernite Occurrences—Oregon: 324.

Umatilla County
Monazite Occurrences—
Weston: 78, 82, 217; 46 lbs. per ton: 11.
Thorium Occurrences—
Weston: monazite: 78, 82, 217; monazite, 46 lbs. per ton: 11.

Uranium Occurrences
See under individual county names and under Index III, Uranium Occurrences—Oregon: 215, 218, 219, 317, 324, 340, 343, 353, 369.
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Uranium Prospecting
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Wallowa County
Monazite Occurrences—
Wallowa: 78, 82, 217; .7 lb. per ton: 11.
Thorium Occurrences—
Wallowa: monazite: 78, 82, 217; monazite, .7 lb. per ton: 11.

Wasco County
Agates, Uranium-bearing, Occurrences—
Eagle Creek station, Mutton Mt.: 215.
Warm Springs Indian Reservation: fluorescent secondary uranium minerals: 353.
Chalcedony, Uranium-bearing, Occurrences—
Warm Springs Indian Reservation: fluorescent secondary uranium minerals: 353.
Perlite, Uranium-bearing, Occurrences—
General: 219.
Silica Deposits, Uranium-bearing—
Mutton Mts. near Warm Springs Indian Reservation: uranium coating: 317.
Uranium Occurrences—
General: uranium-bearing perlite: 219.
Eagle Creek station, Mutton Mt.: uranium in agate: 215.
Mutton Mountain: uranium silica: 218.
Mutton Mts. near Warm Springs Indian Reservation: uranium coating on silica deposits: 317.
Warm Springs Indian Reservation: fluorescent secondary uranium minerals in agate and chalcedony: 353.

Wheeler County
Monazite Occurrences—
Antone: 78, 82; 2 lbs. per ton: 11.
Thorium Occurrences—
Antone: monazite: 78, 82; monazite, 2 lbs. per ton: 11.

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General
Monazite Occurrences—
General: as an accessory mineral in granite, gneiss, pegmatites, aplites, and river sands: 310.
Deposits of no economic value: 231.
Thorium Occurrences—
General: 12, 25; monazite as an accessory mineral in granite, gneiss, pegmatites, aplites, and river sands: 310.
Deposits of no economic value: allanite, monazite: 231.
Uranium Occurrences—
General: 12, 13, 25.
Rainbow Mining Co. property: 4 shafts sunk to study ore bodies, expected to produce uranium, vanadium, copper, lead: 338.
Types: hydrothermal vein deposits: 62.
Uranium Prospecting—
General: 90.

Asotin County
Monazite Occurrences—
Clarkston: trace: 11.
Snake River sand: trace: 11.
Thorium Occurrences—
Clarkston: monazite, trace: 11.
Snake River sand: monazite, trace: 11.

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Chelan County
Pitchblende Occurrences—
Holden mine at Holden: 322.
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Holden mine at Holden: geology: 322; mineralization: 322; pitchblende: 322; structure: 322.
Peshastin station, 12 mi. from: "a 5-foot ledge" of uranium, probably a silicate: 323.

Clallam County
Monazite Occurrences—
Shi-Shi Beach near Cape Flattery: trace: 11.
Thorium Occurrences—
Shi-Shi Beach near Cape Flattery: monazite, trace: 11.

Clark County
Monazite Occurrences—
Canyon Creek: trace: 11.
Thorium Occurrences—
Canyon Creek: monazite, trace: 11.

Douglas County
Monazite Occurrences—
Columbia River: in black sands: 310; sands: 78, 82; 6 lbs. per ton: 11.
Thorium Occurrences—
Columbia River: monazite, 6 lbs. per ton: 11; monazite in black sands: 310; monazite in sands: 78, 82.

Grays Harbor County
Monazite Occurrences—
Grays Harbor: 78, 82.
Moclips: 78, 82; in beach sands: 310; 71.5 lbs. per ton: 11.
Thorium Occurrences—
Grays Harbor: monazite: 78, 82.
Moclips: monazite: 78, 82; monazite, 71.5 lbs. per ton: 11; monazite in beach sands: 310.

King County
Monazite Occurrences—
Seattle: 217.
Thorium Occurrences—
Seattle: monazite: 217.

Monazite Occurrences
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Morning star vein: 45.
Sunshine vein: 45.
Tamarack vein: 45.

RADIOACTIVE GASES

Wyoming
Hot Springs County—
Big Spring, Thermopolis: radium emanation, 3.2×10^{-9} g. Ra per liter: 293.
Black Sulfur Spring near Big Spring, Thermopolis: radium emanation, trace: 293.
Yellowstone National Park County—
Yellowstone National Park:
General: 233; Types include Ra, U, and Th emanations: For specific locations see Wyoming—Yellowstone National Park County—Radioactive Springs: 294.
Allen's Mud Pots, Norris Geyser Basin, E side of road near Porcelain Basin: radium emanation, 38.8×10^{-9} g. Ra per liter: 293.
Amphitheater Springs, 10 mi. S of Mammoth: spring with radium emanation, 44.8×10^{-9} g. Ra per liter: 293.
Clearwater Springs: large pool, radium emanation, 108.0×10^{-9} g. Ra per liter: 293.
Frying Pan, just S of, Norris Geyser Basin: pool, radium emanation, 88.2×10^{-9} g. Ra per liter: 293.
Jupiter Terrace, Mammoth Hot Springs: spring with radium emanation, 0.13×10^{-9} g. Ra per liter: 293.
Lower Geyser Basin, Firehole Geyser Basin, E side of old road: pool, radium emanation, 5.9×10^{-9} g. Ra per liter: 293.
Lower Geyser Basin, Firehole Geyser Basin, W side of Firehole Lake: radium emanation, 89.0×10^{-9} g. Ra per liter: 293.
Lower Geyser Basin NW of Clepsydra Geyser: small spring, radium emanation, 18.6×10^{-9} g. Ra per liter: 293.

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RADIOACTIVE GASES (contd.)
Monument Geyser Basin: small pool near large yellow pool, radium emanation, 5.7×10^{-9} g. Ra per liter: 293.
100 Spring Plain, N part of, Norris Geyser Basin: pool, radium emanation, 38.7×10^{-9} g. Ra per liter: 293.
Shoshone Geyser Basin near Terrace Spring: small pool, radium emanation, 230.0×10^{-9} g. Ra per liter: 293.
Sylvan Springs area: large pool, radium emanation, 3.0×10^{-9} g. Ra per liter; pool ¼ mi. SE of area, radium emanation, 7.6×10^{-9} g. Ra per liter: 293.
Tantalus Creek, Orpiment, Norris Geyser Basin: radium emanation, 11.6×10^{-9} g. Ra per liter: 293.
Terrace Springs, Middle Spring: radium emanation, 6.7×10^{-9} g. Ra per liter: 293.
Upper Geyser Basin, NE side of Biscuit Basin: small pool, radium emanation, 166.0×10^{-9} g. Ra per liter: 293.
Upper Geyser Basin near Gem Pool: small pool, radium emanation, 251.0×10^{-9} g. Ra per liter: 293.
West Thumb of Yellowstone Lake, Lake Shore Spring near roadside 1.3 mi. N of West Thumb Ranger Station: radium emanation, 43.4×10^{-9} g. Ra per liter: 293.
Yellowstone River, Mud Volcano area near road: large pool, radium emanation, 9.8×10^{-9} g. Ra per liter: 293.
Yellowstone River, Violet Springs area, Mud Pot: radium emanation, 201.0×10^{-9} g. Ra per liter: 293.

RADIOACTIVE LIGNITE

Wyoming
Sweetwater County—
Red Desert near Lost Creek: 309.

RADIOACTIVE OCCURRENCES

Montana
Jefferson County—
Basin-Boulder-Clancey area: scattered claims: 286. (See Index II, Montana—Jefferson Co. for individual names: 286.)

RADIOACTIVE OIL

California
Los Angeles County—
Montabello Oil field, crude oil from Well-Temple No. 15: average radioactivity, 1.9×10^{-10} curies/liter: 199.
Montabello Oil field, crude oil from Well-Temple No. 9: average radioactivity, 2.2×10^{-10} curies/liter: 199.

RADIOACTIVE ROCKS

California
California Batholith—
Bonsall tonalite and associated rocks: Bonsall tonalite, average radioactivity of 5 samples, .89 alphas/mg./hr.; Domenigoni granodiorite, average radioactivity of 2 samples, .56 alphas/mg./hr.; Lakeview tonalite. 1 sample, radioactivity, .63 alphas/mg./hr.: 256.
Coldwater Canyon area: granites, average radioactivity of all granites, 2.5 alphas/mg./hr.; miarolitic aplite, 1 sample, radioactivity, 1.86 alphas/mg./hr.: 256.
El Saltro: granodiorite, 1 sample, radioactivity, 1.35 alphas/mg./hr.: 256.
Escondido Creek granodiorite W of Escondido: 1 sample, radioactivity, 1.24 alphas/mg./hr.: 256.
Green Valley tonalite: average radioactivity of 5 samples, 1.01 alphas/mg./hr.: 256.
La Sierra tonalite, NE of Corona: 1 sample, radioactivity, 1.57 alphas/mg./hr.: 256.
Lake Wolford granodiorite: 1 sample, radioactivity, 1.08 alphas/mg./hr.: 256.
Micropegmatite NE of Corona: 1 sample, radioactivity, 3.13 alphas/mg./hr.: 256.
Mt. Hole granodiorite NE of Corona: allanite present; 1 sample, radioactivity, 3.8 alphas/mg./hr.: 256.
Mt. Rubidoux coarse granite: 1 sample with allanite, radioactivity, 1.73 alphas/mg./hr.: 256.
Mt. Rubidoux fine granite: 1 sample with monazite, allanite; radioactivity, 2.23 alphas/mg./hr.: 256.
Robler granite: 1 sample, radioactivity, 2.73 alphas/mg./hr.: 256.
San Marcos gabbro: average radioactivity of 11 samples, .43 alphas/mg./hr.: 256.
Santa Margarita Mts.: granodiorite, 1 sample, radioactivity, 2.21 alphas/mg./hr.: 256.
Temescal Wash granodiorite dike: 1 sample, radioactivity, 1.73 alphas/mg./hr.: 256.
3 aplites: average radioactivity, 1.17 alphas/mg./hr.: 256.
Tonalite near Aguanga in Ramona Quadrangle: average radioactivity of 2 samples, .59 alphas/mg./hr.: 256.
Variation curve of activity: 256.
Winchester, W of: quartz latite porphyry, 1 sample, radioactivity, 1.77 alphas/mg./hr.: 256.
Woodson Mountain granodiorite: average radioactivity of 5 samples, 1.8 alphas/mg./hr.: 256.
Imperial County—
Unnamed location: radioactive kaolinized rock with uranium phosphate: 291.
Los Angeles County—
Devil's Gate Dam, Pasadena; aplite, average radioactivity, 2.0×10^{-12} g. Ra/g. Rock: 199; granodiorite, average radioactivity, 2.6×10^{-12} g. Ra/g. Rock: 199; granodiorite (from Arroyo Seco), average radioactivity, 2.6×10^{-12} g. Ra/g. Rock: 199; quartzdiorite gneiss: average radioactivity, 2.3×10^{-12} g. Ra/g. Rock: 199.
Sheldon well, Pasadena, aplite: average radioactivity, 0.9×10^{-12} g. Ra/g. Rock: 199.
Sunset well, Pasadena, granodiorite: average radioactivity, 0.8×10^{-12} g. Ra/g. Rock: 199.
Ventura well, Pasadena, granodiorite: average radioactivity, 1.4×10^{-12} g. Ra/g. Rock: 199.

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Villa well, Pasadena, quartzdiorite gneiss: average radioactivity, 1.3 × 10^{-12} g. Ra/g. Rock: 199.
Riverside County—
Riverside area
Bonsall tonalite from Shaft No. 2 of Los Angeles Aqueduct, 2 mi. W. of Val Verde: geology; mineralogy (no uranium or thorium minerals); petrography; petrology: 257.
Lakeview tonalite from quarry 4 mi. NNE of Perris: geology; mineralogy (no uranium or thorium minerals); petrography; petrology: 257.
Riverside granodiorite from quarry ¼ mi. NW of Benchmark 1651, 2 mi. WSW of Val Verde: geology; mineralogy (no uranium or thorium minerals); petrography; petrology: 257.
Val Verde tunnel: geology; petrology; radioactivity measurements at 35 stations in tunnel; tonalite: 277.
Southern Part—
California Batholith: average rock of batholith, average radioactivity, 0.9 alphas/mg./hr.: gabbro, average radioactivity, 0.3 alphas/mg./hr.; granites, average radioactivity, over 2.5 alphas/mg./hr.; granodiorite, average radioactivity, 1.4 alphas/mg./hr.; tonalites, average radioactivity, 0.8 alphas/mg./hr.: 256.

Helium Determinations
California—
Riverside County
Riverside area
Bonsall tonalite: activity index; description of samples; preparation of samples; radium content; thorium content: 257.
Lakeview tonalite: activity index; description of samples; preparation of samples; radium content; thorium content: 257.
Riverside granodiorite: activity index; description of samples; preparation of samples; radium content; thorium content: 257.

Helium Index Determinations
California—
Riverside County
Riverside area
Bonsall tonalite: activity index; description of samples; preparation of samples; radium content; thorium content: 257.
Lakeview tonalite: activity index; description of samples; preparation of samples; radium content; thorium content: 257.
Riverside granodiorite: activity index; description of samples; preparation of samples; radium content; thorium content: 257.

Montana
Park County—
Quarry N of Gardiner: excavation in old travertine, radium emanation, 0.6 × 10^{-12} g. Ra per gram: 293.
Stillwater County—
Stillwater Complex, bronzitite; radium content, 0.007 × 10^{-12} g./g.: 216.
Stillwater Complex, dunite; radium content, 0.015 × 10^{-12} g./g.: 216.
Stillwater Complex, harzburgite: petrographic description: 216; radium content, 0.014 × 10^{-12} g./g.: 216.

Radioactivity Determinations
California—
Riverside County
Riverside area
Bonsall tonalite: activity index; description of samples; preparation of samples; radium content; thorium content: 257.
Lakeview tonalite: activity index; description of samples; preparation of samples; radium content; thorium content: 257.
Riverside granodiorite: activity index; description of samples; preparation of samples; radium content; thorium content: 257.

Washington
Whatcom County—
Twin Sisters Mountain, dunite: petrographic description: 216; radium content, 0.008 × 10^{-12} g./g.: 216.

Wyoming
Campbell and Johnson Counties—
Big Horn Mountains
Flathead sandstone of Cambrian age: 261.
Gros Ventre fm.: 261.
Black Butte, 13 mi. NE of North Pumpkin Butte: sandstone from White River fm. and carbonaceous shale and coal beds of Wasatch fm., all radioactive: 261.
Flat Top Mountain (or Shawnee Butte), 65 mi. SE of Pumpkin Buttes: radioactive cap rock of White River age: 261.
Johnson County—
See Radioactive Rocks—Wyoming-Campbell and Johnson Counties: 261.
Yellowstone National Park County—
Yellowstone National Park:
General: 294; siliceous igneous rocks more radioactive than basic lavas: 233.
Main Terrace: travertine: 233.
Mammoth Hot Springs: Jurassic limestone: travertine: 233.
Terrace Mountain: travertine in preglacial capping: 233.

RADIOACTIVE SEDIMENTS

Wyoming
Yellowstone National Park County—
Yellowstone National Park
General: 233.

RADIOACTIVE SOILS

California
Los Angeles County—
California Institute of Technology campus: average radioactivity, 2.3 × 10^{-12} g. Ra/g. Soil: 199.
San Bernardino County—
Lake Arrowhead average radioactivity 3.9 × 10^{-12} g. Ra/ g. Soil: 199.

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RADIOACTIVE SPRING DEPOSITS

Wyoming
Hot Springs County—
Big Spring, Thermopolis: travertine on twigs, radium emanation, 14 × 10^{-11} g. Ra per gram; travertine, 100 ft. above spring, radium emanation, 1.7 × 10^{-11} g. Ra per gram; travertine, 600 ft. above spring, radium emanation, 3.5 × 10^{-11} g. Ra per gram: 293.
Big Spring, W of, Thermopolis: travertine in hill at Big Horn River, radium emanation, 0.7 × 10^{-11} g. Ra per gram: 293.
Big Spring Terrace, Thermopolis: travertine on surface, radium emanation, 21 × 10^{-11} g. Ra per gram: 293.
Big Spring Terrace, Thermopolis, in sink N of spring: travertine, 50 ft. below surface, radium emanation, 0.45 × 10^{-11} g. Ra per gram: 293.
Chugwater on E side of Travertine Hill, E of Bighorn Spring, Thermopolis: radium emanation, trace: 293.
White Sulfur Spring, ¼ mi. N of Big Spring, Thermopolis: travertine, radium emanation, 5.4 × 10^{-11} g. Ra per gram: 293.
Yellowstone National Park County—
Yellowstone National Park
Allen's Mud Pots E side of road near Porcelain Basin, Norris Geyser Basin: radium emanation, 0.3 × 10^{-12} g. Ra per gram: 293.
Black Warrior Spring deposit, Firehole Geyser Basin, Lower Geyser Basin: radium emanation, 44.3 × 10^{-12} g. Ra per gram: 293.
Clearwater Springs: deposit near smal pool, radium emanation, 24.1 × 10^{-12} g.l Ra per gram: 293.
Hot River outlet, 1 mi. N of Mammoth, Mammoth Hot Springs: deposit, radium emanation, 12.3 × 10^{-12} g. Ra per gram: 293.
Hymen Terrace, Mammoth Hot Springs: sample, radium emanation, 16.0 × 10^{-12} g. Ra per gram: 293.
Jupiter Terrace, Mammoth Hot Springs: spring deposit, radium emanation, 7.0 × 10^{-12} g. Ra per gram; travertine deposit, radium emanation, 12.3 × 10^{-12} g. Ra per gram: 293.
Liberty Cone, Mammoth Hot Springs: compact deposit, radium emanation, 2.1 × 10^{-12} g. Ra per gram; porous deposit, radium emanation, 7.8 × 10^{-12} g. Ra per gram: 293.
Lower Geyser Basin: oolitic deposit, radium emanation 1.2 × 10^{-12} g. Ra per gram: 293.
Lower Geyser Basin above Excelsior Spring: algae deposit, radium emanation, 45.00 × 10^{-12} g. Ra per gram: 293.
Main Terrace, Mammoth Hot Springs: old deposit, radium emanation, 0.3 × 10^{-12} g. Ra per gram; recent terrace deposit, radium emanation, 23.0 × 10^{-12} g. Ra per gram: 293.
Main Terrace, near, Mammoth Hot Springs: excavation in old travertine, radium emanation, 6.9 × 10^{-12} g. Ra per gram: 293.
Mammoth Hot Springs: iron-bearing deposit, radium emanation, 1.7 × 10^{-12} g. Ra per gram; travertine deposit, radium emanation, 3.7 × 10^{-12} g. Ra per gram: 293.
Monument Geyser Basin: opal deposit, radium emanation, 0.3 × 10^{-12} g. Ra per gram; rhyolite deposit, radium emanation, 15.0 × 10^{-12} g. Ra per gram: 293.
Old Terrace near Firehole Lake, Lower Geyser Basin: radium emanation, 0.4 × 10^{-12} g. Ra per gram: 293.
Old Terrace above Firehole Lake, Lower Geyser Basin: radium emanation, 0.7 × 10^{-12} g. Ra per gram: 293.
Recent deposit, Firehole Lake, Lower Geyser Basin: radium emanation, 305 × 10^{-12} g. Ra per gram: 293.
Shoshone Geyser Basin near shelter cabin: travertine deposit of deep pool, radium emanation, 0.8 × 10^{-12} g. Ra per gram: 293.
Surprise Pool deposit, Lower Geyser Basin: radium emanation, 0.6 × 10^{-12} g. Ra per gram: 293.

RADIOACTIVE SPRINGS

California
Sonoma County—
The Geysers: radioactive emanations present: 200.

Wyoming
Natrona County—
Tom Bush claims on Nigger Hill, a continuation of the Casper Mts.: two radium springs; water to be sold commercially: 342.
Yellowstone National Park County—
Yellowstone National Park: general: 233; numerous hot springs with radioactive gases, waters, and deposits: 294.
Norris Geyser Basin: thorium emanation in a hot spring: 233.
Radioactive Springs—Wyoming: See also Wyoming—Yellowstone National Park County—Radioactive Springs for specific locations: 294, and Radioactive Waters—Wyoming.

RADIOACTIVE WATERS

California
Los Angeles County—
Anita Baldwin Estate near Pasadena: Source No. 1, average radioactivity, 3.0 × 10^{-10} curies/liter; Source No. 2, average radioactivity, 3.3 × 10^{-10} curies/liter: 199.
Arroyo Seco Spring tunnel near Pasadena: average radioactivity. 0.12 × 10^{-10} curies/liter: 199.
Baldwin Rancho near Pasadena: Source No. 1, average radioactivity, 3.6 × 10^{-10} curies/liter; Source No. 2, average radioactivity, 6.3 × 10^{-10} curies/liter; Source No. 5, average radioactivity, 5.2 × 10^{-10} curies/ liter; Source No. 6, average radio-

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activity, 7.1 × 10^{-10} curies/liter; Source No. 7, average radioactivity, 3.3 × 10^{-10} curies/liter: 199.
Busch well near Pasadena: average radioactivity, 3.7 × 10^{-10} curies/liter: 199.
Devil's Gate tunnel near Pasadena: average radioactivity, 5.3 × 10^{-10} curies/liter: 199.
Eaton Diversion tunnel near Pasadena: average radioactivity, 0.78 × 10^{-10} curies/liter: 199.
Eaton No. 3 tunnel near Pasadena: average radioactivity, 3.7 × 10^{-10} curies/liter: 199.
Garfield well near Pasadena: average radioactivity, 9.2 × 10^{-10} curies/liter: 199.
Huntington well near Pasadena: average radioactivity, 0.10 × 10^{-10} curies/liter: 199.
Los Robles well near Pasadena: average radioactivity, 7.3 × 10^{-10} curies/liter: 199.
Oakland well at Glenarm near Pasadena: average radioactivity, 3.6 × 10^{-10} curies/liter: 199.
Pasadena tap water: average radioactivity, 0.97 × 10^{-10} curies/liter: 199.
Post tunnel near Pasadena: average radioactivity, 1.9 × 10^{-10} curies/liter: 199.
Richardson tunnel near Pasadena: average radioactivity, 5.6 × 10^{-10} curies/liter: 199.
Sheldon well near Pasadena: average radioactivity, 4.8 × 10^{-10} curies/liter: 199.
Sierra Madre near Pasadena: Source No. 1.: average radioactivity, 2.9 × 10^{-10} curies/liter; Source No. 2: 3.2 × 10^{-10} curies/liter: 199.
Sunset well near Pasadena: average radioactivity, 6.4 × 10^{-10} curies/liter: 199.
Venice Pier, seawater: average radioactivity, 0.94 × 10^{-12} curies/liter: 199.
Villa well near Pasadena: average radioactivity, 8.2 × 10^{-10} curies/liter: 199.
Wilson tunnel near Pasadena: average radioactivity, 5.5 × 10^{-10} curies/liter: 199.
San Bernardino County—
Arrowhead Hot Springs, Granite: average radioactivity, 2.0 × 10^{-10} curies/liter: 199.
Arrowhead Hot Springs, Palm: average radioactivity, 3.7 × 10^{-10} curies/liter: 199.
Arrowhead Hot Springs, Penyugal: average radioactivity, 2.2 × 10^{-10} curies/liter: 199.
Harlem Hot Springs: average radioactivity, 18.0 × 10^{-10} curies/liter: 199.
Lake Arrowhead: average radioactivity, .58 × 10^{-12} curies/liter: 199.
Lake Arrowhead, surface: average radioactivity, 0.63 × 10^{-12} curies/liter: 199.
Lake Arrowhead, −40 ft.: average radioactivity, 0.54 × 10^{-12} curies/liter: 199.

Wyoming
Hot Springs County—
Artesian well, 1.5 mi. N of Thermopolis: radium emanation, trace: 293.
Big Spring, Thermopolis: radium emanation, 19 × 10^{-11} g. Ra per liter of water: 293
Dome in Park, Thermopolis: radium emanation, trace: 293.
White Sulfur Spring, Thermopolis: radium emanation, 16 × 10^{-11} g. Ra per liter of water: 293.
Sweetwater County—
Lost Creek: water fluorescent due to a secondary uranium mineral, probably radioactive too: 213.
Yellowstone National Park County—
Yellowstone National Park
Allen's Mud Pots at E side of road, Norris Geyser Basin, Porcelain Basin: radium emanation, 47.9 × 10^{-11} g. Ra per liter of water: 293.
Amphitheater Springs, 11 mi. S of Mammoth, Amphitheater Spring: radium emanation, 15.7 × 10^{-11} g. Ra per liter of water: 293.
Amphitheater Springs, 11 mi. S of Mammoth, two small springs nearby: radium emanation of both, 39.7 × 10^{-11} g. Ra per liter of water: 293.
Apollinaris Springs, 10 mi. S of Mammoth: radium emanation, 166 × 10^{-11} g. Ra per liter of water: 293.
Arsenic Spring, Norris Geyser Basin, Porcelain Basin: radium emanation, 30.0 × 10^{-11} g. Ra per liter of water: 293.
Artemesia Geyser, Upper Geyser Basin: radium emanation, 78.5 × 10^{-11} g. Ra per liter of water: 293.
Bead Spring, Lower Geyser Basin, Firehole Geyser Basin: radium emanation, 29.0 × 10^{-11} g. Ra per liter of water: 293.
Beryl Springs about 5 mi. S of Norris Junction: radium emanation, 118 × 10^{-11} g. Ra per liter of water: 293.
Blue Star Spring, Upper Geyser Basin: radium emanation, 445 × 10^{-11} g. Ra per liter of water: 293.
Butterfly Spring, Upper Geyser Basin: radium emanation, 201 × 10^{-11} g. Ra per liter of water: 293.
Caliente Pool, Lower Geyser Basin, Firehole Geyser Basin: radium emanation, 113 × 10^{-11} g. Ra per liter of water: 293.
Cauliflower pool, Upper Geyser Basin, Biscuit Basin: radium emanation, 84.0 × 10^{-11} g. Ra per liter of water: 293.
Chinaman Spring, Upper Geyser Basin: radium emanation, 56.2 × 10^{-11} g. Ra per liter of water: 293.
Clearwater Springs: large pool at foot of forest, radium emanation, 62.5 × 10^{-11} g. Ra per liter of water; largest pool, radium emanation, 3.7 × 10^{-11} g. Ra per liter of water; South pool, radium emanation, 235 × 10^{-11} g. Ra per liter of water: 293.
Congress Pool, Norris Geyser Basin, Porcelain Basin: radium emanation, 29.8 × 10^{-11} g. Ra per liter of water: 293.
Constant Geyser, Norris Geyser Basin, Porcelain Basin: radium emanation, 54.4 × 10^{-11} g. Ra per liter of water: 293.
Dragon's Mouth, Yellowstone River, Mud Volcano area: radium emanation, 108 × 10^{-11} g. Ra per liter of water: 293.
Economic Geyser, Upper Geyser Basin: radium emanation, 863 × 10^{-11} g. Ra per liter of water: 293.
Emerald Spring at E side of road, Norris Geyser Basin, Porcelain Basin: radium emanation, 264 × 10^{-11} g. Ra per liter of water: 293.

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RADIOACTIVE WATERS (contd.)

Excelsior Geyser Basin, Opal Pool: radium emanation, 23.8 × 10^{-11} g. Ra per liter of water: 293.

Firehole Lake, Lower Geyser Basin, Firehole Geyser Basin; radium emanation, 44.5 × 10^{-11} g. Ra per liter of water: 293.

Frying Pan, 2.2 mi. N of Norris Junction, Norris Geyser Basin: radium emanation, 41.1 × 10^{-11} g. Ra per liter of water: 293.

Frying Pan, just S of, on N side of road, Norris Geyser Basin: small pool, radium emanation, 107 × 10^{-11} g. Ra per liter of water: 293.

Gem pool, Upper Geyser Basin: radium emanation, 24.3 × 10^{-11} g. Ra per liter of water: 293.

Gem pool, small spring near, Upper Geyser Basin: radium emanation, 528 × 10^{-11} g. Ra per liter of water: 293.

Goose Lake, pool near, Lower Geyser Basin, Firehole Geyser Basin: radium emanation, 41.0 × 10^{-11} g. Ra per liter of water: 293.

Great Fountain Geyser, Lower Geyser Basin: radium emanation, 162 × 10^{-11} g. Ra per liter of water: 293.

Hot River: radium emanation, 1.7 × 10^{-9} g. Ra per liter of water: 293.

Iris Spring, Norris Geyser Basin, Porcelain Basin, radium emanation, 11.5 × 10^{-11} g. Ra per liter of water: 293.

Iron Springs near Gibbon Falls: radium emanation, 562 × 10^{-11} g. Ra per liter of water: 293.

Jewell Geyser, Upper Geyser Basin, Biscuit Basin: radium emanation, 142 × 10^{-11} g. Ra per liter of water: 293.

Lake Shore Spring near roadside 1.3 mi. N of West Thumb Ranger Station, West Thumb of Yellowstone Lake: radium emanation, 156 × 10^{-11} g. Ra per liter of water: 293.

Lioness Geyser, Upper Geyser Basin: radium emanation, 182 × 10^{-11} g. Ra per liter of water: 293.

Lower Geyser Basin, Firehole Geyser Basin, pool on E side of road: radium emanation, 275 × 10^{-11} g. Ra per liter of water: 293.

Lower Geyser Basin near Clepsydra Geyser: pool, radium emanation, 1226 × 10^{-11} g. Ra per liter of water: 293.

Mammoth Hot Springs, Hot River, 1 mi. N of Mammoth: radium emanation, 172 × 10^{-11} g. Ra per liter of water: 293.

Mammoth Hot Springs, Hot River, 1 mi. N of Mammoth, new outlet: radium emanation, 161 × 10^{-11} g. Ra per liter of water: 293.

Monument Geyser Basin, central part of area: large pool, radium emanation, 89.7 × 10^{-11} g. Ra per liter of water; small yellow pool, radium emanation, 148 × 10^{-11} g. Ra per liter of water: 293.

Morning Glory Pool, Upper Geyser Basin: radium emanation, 17.0 × 10^{-11} g. Ra per liter of water: 293.

Mustard Spring, Upper Geyser Basin, Biscuit Basin: radium emanation, 418 × 10^{-11} g. Ra per liter of water: 293.

Norris Geyser Basin, N part of 100 Spring Plain: pool, radium emanation, 373 × 10^{-11} g. Ra per liter of water; second pool, radium emanation, 105 × 10^{-11} g. Ra per liter of water: 293.

Paint pot area, West Thumb of Yellowstone Lake: spring, radium emanation, 756 × 10^{-11} g. Ra per liter of water: 293.

Pool in Biscuit Basin: radium emanation, 46.2 × 10^{-11} g. Ra per liter of water: 293.

Pool near Clepsydra Geyser: radium emanation, 12.3 × 10^{-9} g. Ra per liter of water: 293.

Punchbowl Spring, Black Sand Basin, Upper Geyser Basin: radium emanation, 83.4 × 10^{-11} g. Ra per liter of water: 293.

Shoshone Geyser, Shoshone Geyser Basin: radium emanation, 101 × 10^{-11} g. Ra per liter of water: 293.

Shoshone Geyser Basin, deep pool near shelter cabin: radium emanation, 22.5 × 10^{-11} g. Ra per liter of water: 293.

Solitary Geyser, Upper Geyser Basin: radium emanation, 17.0 × 10^{-11} g. Ra per liter of water: 293.

Spasmodic Geyser, Upper Geyser Basin: radium emanation, 225 × 10^{-11} g. Ra per liter of water: 293.

Spouter Geyser, Black Sand Basin, Upper Geyser Basin: spring, radium emanation, 3959 × 10^{-11} g. Ra per liter of water: 293.

Steady Geyser, Lower Geyser Basin, Firehole Geyser Basin: radium emanation, 17.0 × 10^{-11} g. Ra per liter of water: 293.

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Deposit on Great Pine Ridge 16 mi. SW of Pumpkin Buttes: coal bed with highest scintillometer reading contained 0.003% uranium and 0.001% equivalent uranium: 261; sample from siltstone of clinker zone contained 0.062% uranium and 0.10% equivalent uranium: 261; sample of tan siltstone 35 ft. NE of the face contained 0.1% uranium and 0.12% equivalent uranium: 261; uranium at top of Fort Union fm. adjacent to a clinker and baked siltstone zone: 261.
Drainage divide between Dry Fork of Powder River and Powder River: unexamined, potential uranium source: 261.

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URANIUM OCCURRENCES (contd.)
Four Horse store area, 25 mi. NE of Pumpkin Buttes: unexamined, potential uranium source: 261.
Highest point in Gillette coal field area, with conglomeratic facies of White River fm. underlain by Roland coal bed and other coal beds and carbonaceous shales: unexamined, potential uranium source: 261.
Middle Pumpkin Butte, pediment surface sloping N from: sample of Wasatch fm. sandstone, about 500 ft. below base of White River fm., contained 0.004% uranium and 0.051% equivalent uranium: 261.
North-middle Pumpkin Butte, 500 ft. below the top: one sample contained 0.006% uranium and 0.013% equivalent uranium: 261; uranium in soft gray roll in sandstone in Wasatch fm.: 261.
North Pumpkin Butte, S side of: average of six grab samples taken from roll contained 15.14% uranium: 261; uranium deposited as a roll in sandstone and surrounded by black and yellow highly radioactive minerals: 261; uranium discovered in October, 1951, in Wasatch fm. of early Eocene age: 261.
Onion coal mine area: uranium in coals of Fort Union fm.: 261.
Pumpkin Buttes area: genesis of uranium deposits: 261; geography: 261; geology: 261; radioactive tuffs: 261; stratigraphy: 261; uranium deposits in carbonaceous shales: 261; uranium deposits in coal: 261; uranium deposits in sandstone rolls: 261; uranium deposits in tuffs: 261.
Carbon County—
Little Medicine Bow: uranium in chalcedony: 203.
Converse County—
C. Wells claims in Deer Creek area: carnotite: 221.
Crook County—
Bear Lodge: uranium: 382.
Sundance: uranium: 382.
Johnson County—
See Uranium Occurrences—Wyoming—Campbell and Johnson Counties: 261.
Natrona County—
Casper Mountain 8 mi. S. of Casper: carnotite: 220, 221.
Tom Bush claims on Nigger Hill, a continuation of the Casper Mts.: two radium springs on land; water to be sold commercially: 342; uranium ore estimated to average up to 5–10 lbs. uranium per ton; assayer's report showed 1 lb. per ton: 342.
Niobrara County—
Lorimer Minerals Co. radium deposits at Lusk: concentration mill installed: 225; geology: 225; uranophane ore with 4–50% U_3O_8 content: 225.
Lusk: deposits of gold with radium indication found assaying $23 per ton: 341; radium extracted from ore: 273; uranium: 219; uranophane: 273; uranophane in dump of old silver mine: 118; uranophane ore shipped in several carloads had uranium content as high as 4% U_3O_8: 273; uranophane production: 384.
Silver Cliff Hill N of Lusk: ore content up to 20% U_3O_8: 335; uranophane, some uraninite: 335.
Silver Cliff mine at Lusk: about 100 tons of uranium ore produced by March, 1919: 258; Lambert Ore Co. & Lorimer Minerals Corp. shipped 5 carloads of radium ore between Dec. 1918 & Sept. 1919: 221; shipped ore valued at $33,857.48: 220; legal difficulties caused suspension of mining operations for 5 years and, by the time the title was cleared, world radium was being supplied by Belgian Congo deposits: 220; several carloads of uranium ore with 3% U_3O_8 shipped: 258; some ore specimens carried up to 20% U_3O_8: 258; uranophane: 53, 221; uranophane on quartzite gangue: 220; uranophane, probably oxidized from uraninite, in quartzite, discovered in spring of 1918: 258; valuable ore on dumps: 221.
Silver Hill at Lusk: gummite, pitchblende, uranophane: 254.
Platte County—
Wheatland: uranium with gold, silver, etc., in 137-ft. vein developed by D. M. Gray: 339.
Wheatland, 14 mi. NW of: allanite containing uranium and thorium: 315.
Sweetwater County—
Crooked Gap in Red Desert Country, in Lost Creek area: dakeite (schroeckingerite) in a "clay" bank: 350.
Lost Creek deposit near Wamsutter: schroeckingerite: 53.
Lost Creek 45 mi. N. of Wamsutter: schroeckingerite: 219.
Minnie McCormick discovery in Red Desert, 35 mi. N of Wamsutter: uranium: 362.
Red Desert near Lost Creek: genesis: 280; genetic studies: 309; geology: 280, 309; radioactive lignite: 309; radiometric logging: 309; schroeckingerite: 280, 309.
Sweetwater area: uranium in agates: 203.
Top of Continental Divide at 7000 ft. elevation, 40 mi. N of Wamsutter in Red Desert (T.25N, R.94W): dakeite in gypsite seam cut by Lost Creek: 213; geology: 213; probable genesis of dakeite deposit: 213.
Wamsutter: dakeite: 255; schroeckingerite: 218, 245; uranium-bearing lignites: 309.

URANIUM PROCESSES
California
San Bernardino County—
Radio Mines Co. of San Bernardino: new uranium process treatment developed by company: 334.
Wyoming
Niobrara County—
Lorimer Minerals Co. radium deposits at Lusk: concentration mill installed: 225.
Lusk ores: to be processed at Vitro Chemical Co. plant in Salt Lake City: 384.

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Silver Cliff Hill N of Lusk: 50-ton wet gravity uranium concentration plant built by Lorimer Minerals Co. to treat ore: 335.

URANIUM PRODUCTION

Montana
Jefferson County—
Boulder: uraninite, first car-load shipped from state: 388.
Clancey Mining District
Haynes properties 1 mi. W of Alhambra: first uranium shipped from area: 390.

Wyoming
Niobrara County—
Lusk: uranophane: 384.
Silver Cliff Hill N of Lusk: several carloads of ore with 3% U_3O_8 shipped: 335; 50-ton wet gravity concentration plant built by Lorimer Minerals Co.: 335.
Silver Cliff mine at Lusk: about 100 tons of uranium ore produced by March, 1919: 258; Lambert Ore Co. and Lorimer Minerals Corp. shipped 5 carloads of radium ore between Dec. 1918 and Sept. 1919: 221; shipped ore valued at $33,857.48: 220; legal difficulties caused suspension of mining operations for 5 yrs. 221; several carloads of uranium ore with 3% U_3O_8 shipped: 258.

URANIUM PROSPECTING

California
General: 90.

Idaho
General: 90.

Montana
General: 90.

Oregon
General: 90, 308, 317.

Washington
General: 90.

Wyoming
General: 90; Smithsonian Institution found uranium: 124.

URANOPHANE MINERALOGY

Wyoming
Niobrara County—
Silver Hill at Lusk: specimen: 254.

URANOPHANE OCCURRENCES

Idaho
Boise County—
Carterville: 82.
Centerville in Idaho Basin: 298.

Wyoming
Niobrara County—
Lorimer Minerals Co. radium deposits at Lusk: 225.
Lusk: 273, 384; in dump of old silver mine: 118.
Silver Cliff Hill N of Lusk: with some uraninite: 335.
Silver Cliff mine at Lusk: 53, 220, 221; ore shipped contained 3% U_3O_8; some specimens carried 20% U_3O_8: 258.
Silver Hill at Lusk: 254.

URANOPHANE PRODUCTION

Wyoming
Niobrara County—
Lusk: 384.

XENOTIME OCCURRENCES

California
Riverside County—
Southern Pacific Silica quarry, ½ mi. SE of Nuevo: with cyrtolite, monazite in pegmatite: 275; with monazite in pegmatite: 264, 279, 297; with monazite, samarskite: 226, 227; in pegmatites with cyrtolite, monazite, samarskite, yttrocrasite (?): 206.
Winchester, 2 mi. N of: with monazite in pegmatite: 279.

YTTROCRASITE OCCURRENCES

California
Riverside County—
Southern Pacific Silica Quarry, ½ mi. SE of Nuevo: 275; questionable occurrence in pegmatites with cyrtolite, monazite, samarskite, xenotime: 206.

U. S. Atomic Energy Commission, Box 30, Ansonia Station, New York 23, N. Y.

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